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ABSTRACT

This paper describes a planning cost model for estimating the comparable replication cost of an educational program for use in evaluating alternative programs and planning future programs. The conceptual and methodological bases of cost analysis are explored and the shortcomings of present methods for comparison and evaluation of educational programs are described. The proposed model presents a framework for bringing together the resources (facilities, staff, equipment, and materials) required to carry out an educational program and for relating these resources to program output in the form of activities. These relationships provide information on the relative merits of selected changes in the activity structure of a total program, and on the cost consequences of changes in the resource utilization rate or in resource cost. Comparable replication costs for several different programs are estimated to illustrate the use of the model. (Author)

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PROGRAM COST ANALYSIS IN EDUCATIONAL PLANNING

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INTRODUCTION

Any examination of alternative educational programs must be concerned with their effectiveness and cost. Because student performance is one of the measures of the effectiveness of the program, a great deal of attention is being given to the problems of setting criteria of achievement and measuring educational outcome. Less attention has been paid to the equally demanding task of estimating and analyzing the cost of educational programs. If the instructional strategy of new programs is to be successfully utilized by educational planners, information about the cost as well as the effectiveness must be available to the decisionmaker.

This paper explores the conceptual and methodological basis of cost analysis and develops a planning cost model for estimating program cost for use in evaluating alternative programs and in pre-implementation planning for future programs. The planning cost model with its supporting cost analysis methodology provides a consistent basis for estimating the dollar cost of educational programs. The development of the model was undertaken because the current state of the art in costing educational programs does not provide a comparable basis for evaluating alternative programs. The usual practice is to give the cost per student for a program with no indication of what is included in the cost.

When the cost per unit of achievement is used, both the cost and the effectiveness measurement problems are severe. *Education Turnkey News* has drawn attention to several aspects of using this ratio:

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> Even when accurate costs are obtained, it is difficult to compare them with school costs to see which is less, since school costs are kept and reported differently. The comparisons may reveal nothing more than different figures, especially since the firms [performance contractors in the context of this quotation] may depreciate certain items much more rapidly than schools.... It is even more difficult to try to contrast effectiveness with cost. If effectiveness is reported in tenths of a year's achievement, which some statisticians feel is cutting it too closely, and that figure is divided into cost data which is part hidden and part hypothetical, what does the public get? Will a school board really base a major decision on curricular changes on such a "cost per unit of achievement" figure?*

The ratios of cost per student and of cost per unit of achievement are widely used, probably because of the false confidence the "number" engenders and the relative ease with which it can be generated. In most instances, either ratio masquerades as the output of cost-effectiveness analysis. Wisely used, cost-effectiveness analysis of educational programs produces several outputs--the aspects of cost, the measures of effectiveness, and the *relationships between cost and effectiveness*. The problems and the appropriate use of cost-effectiveness analysis in educational planning have been discussed in *Cost-Effectiveness Analysis for Educational Planning*.† Only very seldom is a ratio of cost per student or cost per unit achievement the appropriate end result of a cost-effectiveness analysis.

The planning cost model and its supporting methodology of educational program cost analysis provide a solid basis for resolving, at least in part, the problems encountered in determining the "cost" of educational programs. The planning cost model assists in developing comparable cost estimates of alternative programs. In this way, the model directly addresses the problems inherent in using an undefined cost per student in evaluation of different programs.

In estimating the program cost to be used in *comparing programs*, the resources available within a specific district or assets inherited

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*Reed Martin and Peter Briggs, *Education Turnkey News*, February-March 1971.

†*Cost-Effectiveness Analysis for Educational Planning*, M. B. Carpenter and S.A. Haggart, The Rand Corporation, P-4327, March 20, 1970; also reprinted in *Educational Technology*, October 1970, pp. 26-30.

from discontinued programs are *not* taken into account, and a standard price for common resources, such as teachers, is used. The resulting estimated program cost is identified as the *comparable replication cost*. It is, in essence, a comparable cost that normalizes the cost of programs.

In estimating the program cost to be used in deciding whether or not a particular program can be implemented in a specific district, the resources available within the district and district-specific prices for these resources must both be determined. The resulting estimated program cost in this case is the *incremental cost* to the district.

The role of the planning cost model in estimating both the comparable replication cost and the incremental cost is pictured in Fig. 1. In this process, the first step, common to estimating either the comparable replication cost or the incremental cost, is a definition of the program in terms of its objectives, its students, and its resource requirements. These resource requirements are translated into the type of program cost estimate relevant to the decision to be made. The planning cost model, by providing a consistent methodology for estimating program cost, helps insure cost comparability among programs for decisionmaking purposes.

Before describing the planning cost model, a short discussion of the concepts and techniques of cost analysis underlying the development of the model should be helpful. The use of the model in estimating the comparable replication cost and the incremental cost is illustrated in the final part.

COST ANALYSIS

Cost analysis is concerned with the determination of physical resource requirements for the program, with calculating the program dollar cost, and with systematically evaluating the impact of changes in the program on both the resources needed and their dollar cost. The approach is to first determine the facilities, staff, equipment, materials, and services needed to conduct the educational program and to then translate these resource requirements into an estimated program cost. This sequence forces explicit consideration of the varying resource requirements for different programs or for changes in program scope.

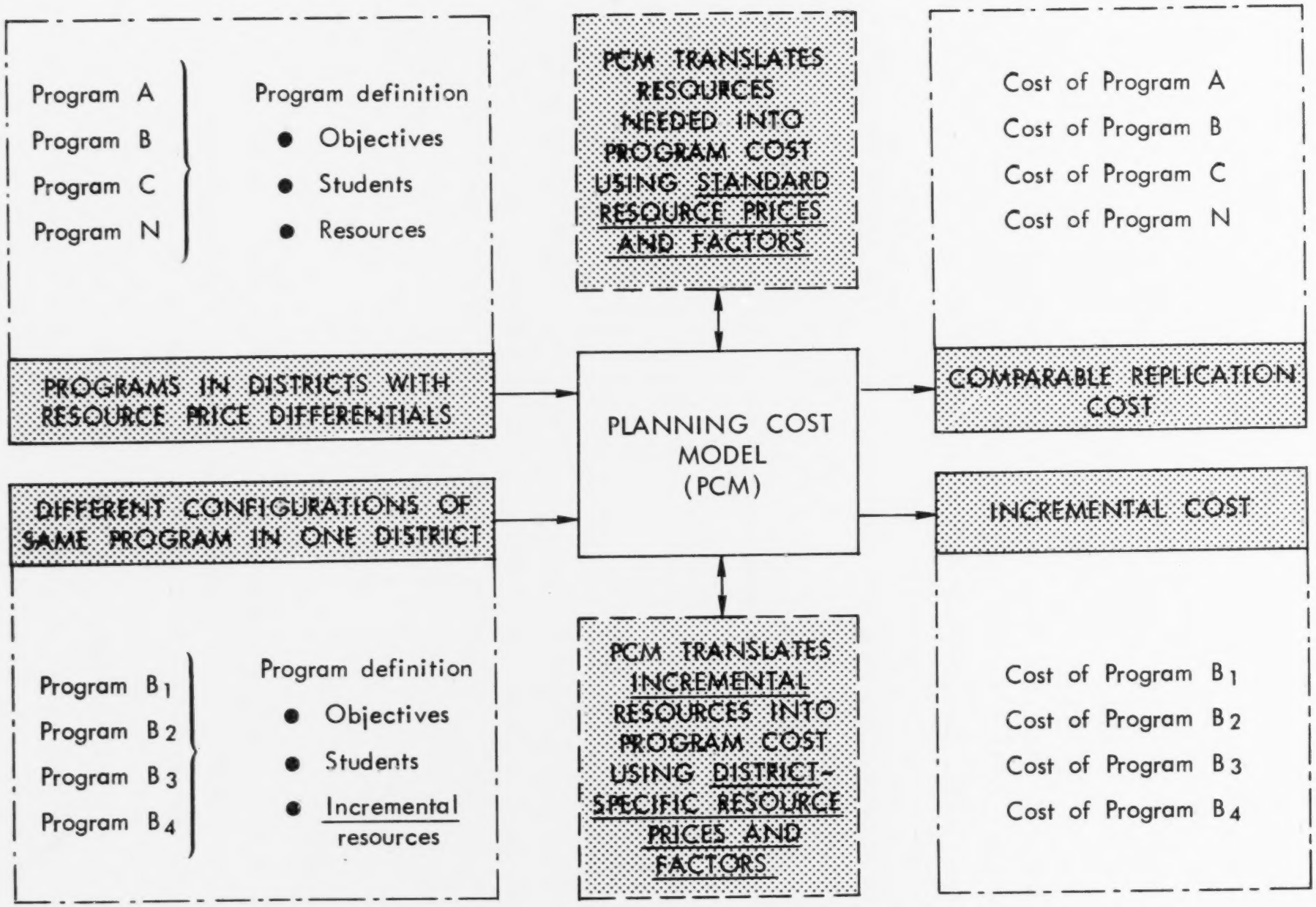

Fig. 1 — Process of estimating the comparable replication cost and the incremental cost of programs

The educational program has as its core an instructional strategy. This instructional strategy includes both the resources and the way in which the resources are used to produce the educational outcome.

Definition of the Educational Program

The first step in analyzing the resource requirements and cost of a program is the definition of the program. The quality of the estimate of the cost of an educational program depends on the completeness with which the resource requirements of the program are determined. This determination, in turn, depends on the description of the educational program. The sequence of events then begins with a description of what the program is and how the program works and continues with a determination of the quality and quantity of the resources. These resource requirements are translated into an estimate of the program dollar cost. In defining the program, the types and magnitude of support activities or services also need to be identified.

Determination of Resource Requirements

The definition of the educational program is followed by the determination of the resource requirements. The data required are arrayed in the illustrative format of Fig. 2. Some of the categories in Fig. 2 pertain to resources directly. Others are "functional packages," such as training, which are combinations of resource items. Additional data should be provided as appropriate for specific programs. Each of the items in the format will be defined in terms of the kind of information needed.

Data about the characteristics of the students served and the number of students in the program will, of course, be the same data required for the evaluation of the effectiveness of the program. Data on other district conditions that might have an effect on the outcome, such as income level, turnover rate, or mobility, should be provided. The instructional time should be given, along with other information that relates to determining the actual time spent with subgroups of students or individual students. The student-teacher ratio is usually used as a proxy for this, but an effort should be made to refine this piece of information.

Characteristics of Students Served

Number of Students

Instructional Data
  Class time
  Class size

Facilities
  Space
  Students/classroom/day
  Utilization
  Furnishings

Staffing
  Teachers
  Special teachers
  Paraprofessionals
  Other personnel

Equipment
  Program-related
  Student-related

Materials
  Program-related
  Student-related

Pre-service Training

In-service Training

Other Support

Fig. 2--Format for program and resource information

In describing the facilities needed, the space requirements, including mobile or portable classrooms, laboratories, and their utilization rates, should be carefully determined. The requirements for non-school facilities should also be stated. The special needs for electrical outlets, air conditioning, carpeting, and lighting should be identified. Furniture needs are to be specified, identifying any special per-student requirements.

Staffing for the program should be described in terms of the qualifications needed as well as in terms of number (e.g., give number of certificated or certified teachers, the number of special teachers, paraprofessional staff, and other personnel involved in the program). If a staff member works less than full time, the percent of time involved should be given. Staff requirements for time beyond the "normal" school day should be stated. This includes, for example, custodial or security services needed to keep the school open after the regular day.

Equipment and materials should be identified as program-related, classroom-related, or student-related. Program-related equipment or material is that which will be used by several students during the day or some time period of the program. Very often the equipment or materials may be grouped by classroom unit. Student-related equipment or material is that which is required because there is a specific number of students in the program. An additional distinction should be made about the consummable nature of the materials and about the lifetime of the equipment. The same treatment should be applied to supplies if the usual district practice is to treat equipment and supplies as separate categories.

The amount of time involved in pre-service and in-service training should be specified. The materials or equipment required should be given. It should be noted if the training time is included as part of the regular time of the staff or if it is incremental to the regular working hours. If in-service training time is a substantial part of the individual teacher's time, additional teachers (or substitute teachers) may be required for the instructional load of the program.

The requirement for program-related services such as evaluation or other management activities should be given. It is preferable if the actual time or the numbers of consultants can be specified. In either case, the purpose is to provide some estimate of the magnitude of these services so that the decision can be made on what it costs to buy the service rather than to develop, if possible, an in-house capability.

Support from other activities means the support required by the educational program from such service functions as transportation. For example, a particular educational program might need bus transportation for field trips. This instructionally-required transportation is over and above the cost of home-to-school transportation.

The resource requirements identified in Fig. 2 are meant to be suggestive only. If other data are available, they should be given, since the purpose is to define as completely as possible those resources and cost-generating activities needed to carry out the educational program.

The resource requirements are then translated into the dollar estimates of program cost--either the comparable replication cost or the incremental cost. A planning cost model provides a framework for systematically and consistently estimating program cost.

THE PLANNING COST MODEL

The planning cost model provides the mechanism to determine, conveniently and consistently, the cost of various alternative programs. By design, the model is appropriate for pencil-and-paper operation as well as computer operation.*

The model provides the framework for bringing together the resources (facilities, staff, equipment, materials) required to carry out an educational program and for relating these resources to program output in the form of activities.

By relating the inputs required to produce outputs, in terms of activities, the model provides more information for making decisions about the merit of selected changes in the activity structure of the total program. For example, trade-offs between fewer but longer instructional periods and more but shorter periods could be assessed. The model also provides the basis for examining the cost consequences, for the total program, of changes in the resource utilization rate (i.e., student/teacher ratio) or in resource cost (i.e., teacher salary).

The task of constructing the model demanded a close examination of the concepts of cost analysis, especially in their application to educational program cost methodology. This examination resulted in the delineation of an approach to costing educational programs. Basic to this is the definition of a preliminary list of cost categories. Those costs of school district operation *not* affected by the existence of the

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*A planning cost model designed for computer operation is described in R-672-SJS, *Project R-3, San Jose, California: Evaluation of Results and Development of a Cost Model*, M. L. Rapp, M. B. Carpenter, S. A. Haggart, S. H. Landa, and G. C. Sumner, The Rand Corporation, March 1971.

program are not included in the estimated cost of the program. An example will serve to clarify this point.

The district cost category, transportation, provides for the transportation of students to and from school. Students in the special program will continue to receive transportation, if they need it, just as though they were not in the special program but were, instead, students in the regular program. This regular transportation cost is not included in the cost of the individual program. But, if the instructional method of the special program calls for field trips or other activities requiring transportation, the cost of this transportation is included as a cost of the special program.

Cost Categories

The items, services, people, and activities and their cost required for an educational program can be brought together in one format--the cost element structure shown in Fig. 3. These cost elements are grouped into two broad categories: the acquisition cost and the operational cost. The cost of most programs can be adequately encompassed within

Acquisition Cost	*Operational Cost*
Design of program*	Program direction*
Development of materials*	Evaluation*
Evaluation design*	Management support*
Program implementation	Salaries
Equipment	Teachers
Program-related	Paraprofessionals
Student-related	Specialists
Materials and supplies	Other
Program-related	In-service training
Student-related	Materials and supplies
Pre-service training	Program-related
Facilities (space)	Student-related
Installation	Equipment
	Replacement
	Maintenance
	Facilities O&M
	Contracted services
	Media services
	Transportation

*In an operational program, as opposed to a demonstration program, there might be no program cost associated with these activities.

Fig. 3--Cost element structure for educational programs

these two broad categories. The acquisition cost is the one-time cost to acquire a capability. The operational cost is the continuing cost to maintain a capability over a period of time. In the following discussion, one year's operating cost is assumed.

The acquisition, or one-time, cost to acquire a capability is, in practice, also referred to as initial, investment, or capital cost. It covers the cost of all resources required to acquire a capability. The cost of the effort devoted to research, development, or design of components of the program or alternatives should be included as part of this cost. The cost of designing a different mathematics curriculum, for example, is a development cost. In estimating the *comparable replication* cost, however, some overall development costs might be treated as sunk costs. That is, the first program to use the new curriculum would incur this expense, and subsequent programs using the curriculum would inherit the new curriculum on a cost-free basis. On the other hand, if the curriculum had to be redesigned for a particular program, this would be a development cost for that program.

The operational cost is also referred to as the recurring or continuing cost to maintain the capability. The cost of modification of facilities and the cost of in-service training of teachers are included as an operational cost to maintain the program. These broad categories of cost--acquisition and operational--are used as a basis for organizing the cost elements into the cost element structure.

This structure provides the framework for identifying the cost of the program in an operational environment. Each element, whether it is an item purchased or an estimate of activity cost, will be discussed. But first, remember that costs not varying because of the existence of the program are not included. For example, district-wide administrative costs are not allocated.

Costs that might be incurred in a demonstration program but not in an *operational* program are identified by an asterisk in Fig. 3. Some of the cost categories can be characterized as the cost of activities rather than the cost of items purchased. In many instances, the items purchased quite clearly underlie the cost of activities, but the activity cost, however, may be used directly in estimating the program cost. For example, the evaluation cost of a program might be estimated by using a factor such as cost per student. Or, the cost per program might

be used if the evaluation is done by an outside contractor or evaluator. If appropriate, these would be the factors used to estimate the *operational* cost of evaluation. The *acquisition* cost--the non-recurring cost--for evaluation might be based on the district staff time to design the evaluation of the program or might simply be the cost charged by the outside evaluator. The cost basis for these inputs would be per *program* for acquisition cost and per *student* or *program* for the operational cost.

Cost Basis for Inputs

The cost basis for all inputs for the categories in the cost element structure is shown in Table 1. For each category the cost basis

Table 1

THE COST BASIS FOR INPUTS

Categories	*Cost Basis*			
	Student	*Program*	*Unit*	*Service*
Acquisition Cost				
Design of program		×		
Development of materials		×		
Evaluation design		×		
Program implementation		×		
Equipment				
Program-related		×	×	
Student-related	×			
Materials				
Program-related		×	×	
Student-related	×			
Pre-service training		×		×
Facilities	×			
Installation			×	
Operational Cost				
Program direction		×		
Evaluation	×	×		
Management support		×		
Salaries				
Teachers	×			
Paraprofessionals	×			
Specialists	×	×		
Other	×	×		
In-service training		×		×
Materials and supplies				
Program-related		×	×	
Student-related	×			
Equipment				
Replacement			×	
Maintenance			×	
Facilities O&M				×
Contracted services	×			×
Media services	×			×
Transportation	×			×

is either per student, per program, per unit, or direct service charge. The per student and per program distinction is rather obvious; the per unit basis refers to units such as classrooms, resource centers, and language laboratories. The service basis is used when the input to the model might be the extent of a service performed either within the district or by an outside source. An example of the former would be the operation and maintenance of the facilities; the latter service-based input might cover such items as the contracted transportation for the instructional part of a program or the provision of so many hours of instructional television.

In some cases, the cost input basis might be a combination of program and unit (classroom), of student and service, or of program and service. No rigidity is implied. The intent is to provide an understanding of how the inputs of the model are categorized. This categorization is basic to the structure of the planning cost model. At this time, it is only necessary to emphasize that some level of input is required because there is a certain number of students, and other levels of input are required because there is a certain number of classrooms or instructional centers. In many cases, there is a *program* cost that is independent of the number of students or centers.

Outputs and Inputs of the Model

A program-related cost can be a thruput to the model. For example, the cost of program development would be both an input and output. The cost of pre-service training for the teachers in the program is calculated within the model. The physical descriptors of the program and cost factors, such as the number of teachers, the salary cost, the cost per mile, are the inputs to the model. The objective is to keep the number of inputs to a workable minimum while allowing enough input flexibility to provide useful outputs of the model for the evaluation and planning of educational programs.

The outputs of the model are, in general, the resource and cost information about the specific educational program. The *descriptors of the program*--number of teachers; number of students; space requirements; equipment, materials, and supplies; and need for services such as transportation or evaluation--are *shown right along with the cost*

output. The purpose is to provide, in one place, an estimate of the comparable replication cost and a description of what is being bought. As this practice becomes more prevalent, the use of a cost per student to describe an unknown quantity will decrease and the quality of information available to the educational planner will increase.

The output of the model is illustrated in Figs. 4 and 5. Notice the similarity of the format to the cost element structure of Fig. 3. More detailed information for any of the items shown can be provided in supporting reports. For example, the resources and cost underlying the cost per student hour under Media Services might be of interest for some types of decisions. The supporting detail for this would follow the same cost element structure used for estimating the cost of the entire educational program.

Description of Program

Program:	Objective:
Staffing:	Student Characteristics:
Facilities:	
Equipment:	Operational Characteristics:
	Instructional time
Materials:	Student grouping
	Location

Acquisition Cost

Program activities	$ ×××
Equipment	××
Facilities	××
Materials	××
Total acquisition cost	$ ××××

Operational Cost

Program activities	$ ×××
Salaries	××××
Materials	××
Supplies	××
Equipment	××
Other support	××
Total operational cost . . . . . :	$×××××

Fig. 4--Summary output of the model

Acquisition Cost			
Program Activities:	Design of Program	$ xxx	
	Development of Materials	xxx	
	Evaluation Design	xxx	
	Program Implementation	xxxx	
	Pre-service Training	xxx	
	Installation	xxx	
			$xxxxx
Equipment:	Program-related	$ xxx	
	Student-related	xxx	
			xxxx
Facilities:	Student-related	$ xxx	
			xxx
Materials:	Program-related	$ xx	
	Student-related	xx	
			xxx
	Total Acquisition Cost		$xxxxx
Operational Cost			
Program Activities:	Program Direction	$ xxx	
	Evaluation	xxx	
	Management Support	xx	
	In-service Training	xx	
	Facilities O&M	xx	
	Contracted Services	xx	
	Media Services	xx	
	Transportation	xx	
			$ xxxx
Salaries:	Teachers	xxxx	
	Specialists	xxx	
	Paraprofessionals	xxx	
	Other	xxx	
			xxxx
Materials:	Program	xx	
	Student	xx	
			xxx
Supplies:	Program	xx	
	Student	xx	
			xx
Equipment:	Replacement	xx	
	Maintenance	xx	
			xx
Other support:			xx
	Total Operational Cost		$xxxxx

Fig. 5--Detailed output of program cost estimate

The inputs of the model fall into three broad groups: (1) the physical descriptors of the program; (2) the cost of resources and services; and (3) the factors or estimating relationships. The physical descriptors, including the type and quantity of resources, were shown in Fig. 2, *Format for Program and Resource Information*. In short, these inputs describe the students, the educational program, and the resource requirements. Inputs are required for all the changes, or variables, that make one program different from another program.

The inputs describe the cost of resources and services and cover such items as the cost of equipment used, the salaries of the staff, the cost of testing, the cost of transportation, and the cost of training. The input factors, or estimating relationships, include both cost factors such as cost of materials per student and non-cost estimating relationships such as number of in-service training days per teacher.

The Structure of the Model

The model integrates the program description, in terms of resources required, with the process of estimating the program cost. This process begins with the determination of resource requirements and continues with the translation of these resource requirements into an estimate of dollar cost. Both the acquisition cost and the operational cost are estimated.

The model's framework for estimating the acquisition and the operational cost is shown in Figs. 6 and 7, respectively. For each cost category there is an estimate of cost on either a student, program, unit, or service basis. In the case of "units," the estimate can be the cost per teacher, the cost of the equipment per classroom or instructional center, or the cost per student or materials consumed. For some cost categories, the estimate can be based on an overall program cost. For example, the pre-service training, if done by an outside contractor, might be a total cost for the program. It could also be a cost per teacher.

In the cost category for Materials, the cost estimate may require an estimate for the cost for student-related materials, for the cost of materials in the classroom for use by many students, and for the cost of program materials used by the staff in conducting the program. The same practice is followed for the cost categories of the framework for the operational cost in Fig. 7.

Cost Category	*Student*	*Program*	*Unit*	*Services*
Design of Program		$/Program		
Development of Materials		$/Program		
Evaluation Design		$/Program		$/Service
Program Implementation		$/Program		
Pre-service Training		$/Program	$/Teacher	$/Service
Installation		$/Program	$/Equipment	
Equipment	$/Student	$/Program	$/Classroom $/Resource Center	
Facilities	$/Student		$/Resource Center	
Materials	$/Student	$/Program	$/Classroom	
Other Support	$/Student	$/Program	$/Classroom	$/Service

Fig. 6--The planning cost model--acquisition cost

Cost Category	*Student*	*Program*	*Unit*	*Services*
Program Direction		$/Program		
Evaluation		$/Program		$/Service
Management Support		$/Program		$/Service
Facilities O&M			$/Space	
Contracted Services				$/Service
Media Services				$/Service
Transportation	$/Student	$/Program		
Salaries (including fringe benefits)				
Teachers			$/Teacher	
Specialists			$/Specialist	
Paraprofessionals			$/Aide	
Other			$/Type	
Materials				
Program-related	$/Student	$/Program		
Student-related	$/Student			
Supplies				
Program-related		$/Program		
Student-related	$/Student			
Equipment				
Replacement			$/Unit	
Maintenance			$/Unit	
Other Support	$/Student	$/Program	$/Unit	$/Service

Fig. 7--The planning cost model--operational cost

The cost categories provide a convenient way to identify the data needed about the educational program and its operation in order to estimate its cost. The data for the cost categories for both the acquisition and operational cost are shown separately in Figs. 8 and 9, respectively.

USE OF THE PLANNING COST MODEL

Estimating the Comparable Replication Cost

The use of the model will be illustrated by estimating the comparable replication cost for several different programs. It should be emphasized that in order to compare programs in different districts, comparable resources prices and salaries have to be used. A comparison of actual costs would have little meaning since the differences among programs would not only reflect differences in the programs but also differences in teacher salaries and other local prices.

As shown in Fig. 1, the process of estimating the comparable replication cost and the incremental cost for a program begins with a description of the program and its resource requirements. This information is then processed through the model in order to estimate the cost. The description of the program includes both program information and resource information as shown in the format of Fig. 2.

The program and resource data for several illustrative programs are given in detail in the appendix. The summary of this information is given in Table 2. The resource requirements are estimates of what it would take to replicate the instructional strategy of the program.

The information under Other Support provides an example. In the replicated program, there is an item for consultants to the program. It is estimated as approximately eight days for the year of program operation. This is an estimate of what might be needed in a future program rather than an estimate of what was used in past programs. The same is true for Program Evaluation. A category for this type of activity calls attention to the need for evaluation of the program even in operation as part of the regular district programs. In the estimate for the replication cost, this category incurs a cost per student for evaluation of the program.

Cost Category	*Data Requirements*
Design of Program Development of Material Evaluation Design Program Implementation Pre-service Training Installation	o If these activities are required for the program, the *number*, the *type* of personnel involved, the *time* spent, and salary are needed.
Equipment	o The equipment list is determined for each student, for each classroom, and, if applicable, for the program. The classroom's equipment is used by several classes of students. The number of students that can use the equipment is specified.
Facilities	o The space required is that over and above the regular program; both for each student or for special resource centers.
Materials	o The initial stock of materials is determined for each student, for each classroom, and, if applicable, for the program.

Fig. 8--Program data--acquisition cost categories

Cost Category	*Data Requirements*
Program Direction Evaluation Management Support	o The number and type of staff, the time spent for each activity, and salary are needed for this.
Salaries (with fringe benefits)	o All instructional staff and direct support classes of staff are identified by broad category; i.e., general teachers, specialists, and aides rather than a teacher with a specific salary are used. Fringe benefits are included at the district percentage factor.
Materials and Supplies	o The type and quantity of materials used are specified on a student and program basis.
Equipment	o The equipment maintenance factor and the equipment replacement factor (based on the estimated lifetime of the equipment) are applied to the equipment used in the program.
Facilities O&M Contracted Services Media Services Transportation	o The program requirements for each of the categories are specified in terms of square feet maintained, services purchased, number of hours of audio-visual instruction and bus trip mileage.

Fig. 9--Program data--operational cost categories

Table 2

PROGRAM RESOURCE REQUIREMENTS

Item		*Program A*	*Program B*	*Program C*	*Program D*	*Program E*	*Program F*
Number of Students:	Reading	350	285	491	150	103	250
	Math	350	285	535	150	103	---
Instructional Time:	Reading	1	1	1	1.25[a]	1.25	1
(in hours)	Math	1	1	1	1.25	1.25	---
Facilities							
Space		4 trailers 2 classrooms 900/1000	4 trailers 1 classroom 1600/1000	2 sgl centers[b] 1 dbl center[b] 1 reinforcement	1 classroom 1 activity area	1 classroom 1 activity area	2 classrooms ---
Total square feet		5600	4600	8000	2000	2000	2000
Air conditioned		x	x	x	x	---	x
Carpeted		x	x	x	x	x	x
Special wiring		x	x	x	x	x	x
Carrels		x	x	x	x	x	---
Tables		x	x	x	x	x	x
Utilization							
Time in use		3(2-hr)shifts	3(2-hr)shifts	7 periods	5[a]	5	5
Student/instructional unit		20	20	40-S; 65-D	50	50	25
Area/student (sq ft)		50	50	50	40	40	40
Staffing							
Teachers/center or unit		1	1	1	1	1	1
Paraprofessionals/unit		1	1	1	2	3	1
Students per teacher		20	20	40/60	50	50	25
Teachers per program		6	5	4	1	1	2
Paraprofessionals/program		6	5	5	2	3	2
Other direct		---	---	---	---	---	---
Equipment							
Major items		Dorsett M-86 Teaching machine	EDL AUD-X Controlled readers Tach-X Flash-X	Hoffman readers Tape recorders Flashcard rdrs Borg-Warner 80 (backup)	Telex Cassette recorders Tape recorders	Telex Cassette recorders Tape recorders Language master	Cassette players Tape recorders
Materials							
Program-related		Filmstrips Records Dorsett materials	Filmstrips Discs EDL materials	Hoffman matls EDL materials Great variety Borg-Warner matls	BRL materials Cassettes Variety of other	BRL materials Cassettes Variety of other	Filmstrips Cassettes Paperbacks
Consumables (student-related)		x	x	x	x	x	x
Pre-service training							
Teachers		2 weeks	1 week	2 weeks	1 week	1 week	1 week
Paraprofessionals		2 weeks	1 week	---	1 week	1 week	---
Other staff		---	---	---	1 week	---	---
In-service training		5 days	---	2 hr/wk	4 days	3 days	3 days
Other Support							
Student diagnostic services		---	---	---	x[c]	x[c]	---
Program evaluation		x	x	x	x	x	x
Consultants		8 days	8 days	8 days	8 days	8 days	8 days

[a] Two 75-minute periods for grades 1-4 with reinforcement in regular classes. One 2.25-hr period grades 5 and 6.

[b] Each center has an instructional area plus an activity area.

[c] A remote diagnostic and prescriptive services.

The dollar cost information for these illustrative programs is shown shown in Table 3. These are for the estimates of the comparable replication cost. This information is combined with the program and resource information of Table 2 and provides the basic input information for the planning cost model.

The standard input costs and the factors for use in the planning cost model are given in Fig. 10. The term "standard" is used as a description of the factor used across all programs.

A cost of $12,000 per year per teacher is used in the model to estimate the comparable replication cost. This includes the fringe benefits (fixed charges in most district accounting systems). This is obviously out of line for, say, a small rural district in the southeastern part of the country. But because this factor was used for all the programs, the different cost for the salary expense of the program cost actually *reflects the difference in the number of teachers needed* for the program. This same argument applies to all the standard resource costs and factors used in the planning cost model.

The comparable replication cost for each of the illustrative programs is given in Table 4. The acquisition cost includes the cost to remodel and furnish the instructional centers, the cost of the equipment and the materials needed for all the instructional centers, and the pre-service training cost of the program staff. The operational cost includes the salaries of the staff, the cost of materials consumed or lost through attrition or theft, the cost of replacing and maintaining the equipment, the cost of in-service training, and other support, which includes a program evaluation cost on a per-student basis per year and consultants required during the year. The comparable replication cost along with the relevant dimensions of the specific programs is summarized in Table 5.

The estimation of the comparable replication cost has an advantage in addition to adjusting for variations in the resource prices so that the cost of programs in different districts is on a comparable basis. This advantage lies in the discipline necessary to organize the program information and the cost information. In Table 5, the operational cost per student per subject offers a quick comparison of the relative merits of the programs. The other data of Table 5 can be analyzed in a similar fashion. Care must be taken, however, not to develop misleading "results."

Table 3

PROGRAM COST INFORMATION

(Costs in dollars)

	Program A	*Program B*	*Program C*	*Program D*	*Program E*	*Program F*
Equipment Cost						
Total	20,400	15,000	37,000	2,500	2,000	5,000
Cost per instructional area	3,400	3,000	9,250[a]	2,500	2,000	2,500
Number of instructional areas	6	5	4	1[b]	1[b]	2
Students per instruct'l area	20	20	40/65[c]	50	50	25
Replacement--10 percent	2,040	1,500	3,700	250	200	500
Maintenance--10/20 percent	4,080	3,000	7,800	250	200	500
Materials Cost						
Total	18,000	20,000	45,000	8,000	8,600	7,600
Cost per instructional area	3,000	4,000	11,250[a]	8,000	8,600	3,800
Number of instructional areas	6	5	4	2	2	2
Consumables ($ per student)	10	10	10	10	10	5
Pre-service Training						
Number of staff days[d]	120	50	90	15	20	20
Cost per day[e]	200	200	200	200	200	200
Total cost	24,000	10,000	18,000	3.000	4,000	4,000
In-service Training						
Number of staff-days	30	--	32	12	12	12
Cost per day	200	--	200	200	200	200
Total cost	6,000	--	6,400	2,400	2,400	2,400
Other Support						
Student diagnostic services	--	--	--	50[f]	50[f]	--
Student evaluation ($/student)	10	10	10	10	10	10
Consultants ($100/day)	800	800	800	800	800	800

[a] Cost per center includes reinforcement areas. Single center cost slightly more than cost shown.

[b] One classroom area plus one activity area.

[c] Forty students per single center, sixty-five per double.

[d] Includes time for paraprofessional training.

[e] Includes salary, materials, and training costs.

[f] Remote diagnostic and prescriptive services.

Facilities	
Remodeling (including carpeting, airconditioning, etc.)	$ 3,000/center
Furnishings (including carrels)	$ 2,000/center
Equipment	
Replacement	10%
Maintenance (depends on estimate of reliability based on complexity)	10% or 20%
Materials	
Attrition from use, theft	10%
Consumables	$10/student
Salaries (including fringe benefits)	
Teachers	$12,000/year
Paraprofessionals	$ 5,000/year
Specialists	$12,000/year
Program directors	$15,000/year
General support	$10,000/year
General administrative	$12,000/year
Consultants	$100/day
Pre- and In-service Training (including salaries, materials, training)	$200/day
Program Evaluation	$10/student

Fig. 10--Standard resource costs and factors

Table 4

COMPARABLE REPLICATION COST FOR THE ILLUSTRATIVE PROGRAMS

(In dollars)

Acquisition Cost	*Program A*	*Program B*	*Program C*	*Program D*	*Program E*	*Program F*
Facilities (remodel, furnish)						
Total program cost	30,000	25,000	20,000	7,500	7,500	10,000
(Cost/instructional area)	(5,000)	(5,000)	(5,000)	(3,750)	(3,750)	(5,000)
Equipment						
Total program cost	20,400	15,000	37,000	2,500	2,000	5,000
(Cost/instructional area)	(3,400)	(3,000)	(9,250)	(2,500)	(2,000)	(2,500)
Materials						
Total program cost	18,000	20,000	45,000	8,000	8,600	7,600
(Cost per instructional area)	(3,000)	(4,000)	(11,250)	(8,000)	(8,600)	(3,800)
Pre-service Training	24,000	10,000	18,000	3,000	4,000	4,000
Total acquisition cost	92,400	70,000	120,000	21,000	22,100	26,600
Operational Cost						
Salaries (incl fringe benefits)						
Teachers ($12,000/yr)	72,000	60,000	48,000	12,000	12,000	24,000
Paraprofessionals ($5,000/yr)	30,000	25,000	25,000	10,000	15,000	10,000
Other (variable)	--	--	--	--	--	--
Materials						
Program-related (10%)	1,800	2,000	4,500	800	860	760
Consumables (student)	3,500	2,850	5,000	1,500	1,030	2,500
Equipment						
Replacement	2,040	1,500	3,700	250	200	500
Maintenance	4,080	3,000	7,800	250	200	500
In-service Training	6,000	--	6,400	2,400	2,400	2,400
Other Support						
Student diagnostic services	--	--	--	7,500[a]	5,000[a]	--
Student evaluation (testing)	3,500	2,850	5,000	1,500	1,000	2,500
Consultants ($100/day)	800	800	800	800	800	800
Total operational cost	123,720	98,000	106,200	37,000	38,490	43,960

[a]Remote diagnostic and prescriptive services.

Table 5

COMPARABLE REPLICATION COST

(Costs in dollars)

Item	*Program A*	*Program B*	*Program C*	*Program D*	*Program E*	*Program F*
Number of students	350	285	515	150	103	250
Number of students/instr center[a]	20	20	40/65[b]	50	50	25
Acquisition cost	92,000	70,000	120,000	21,000	22,000	26,600
Number of instructional centers	6	5	4[c]	1[d]	1[d]	2
Operational cost	124,000	98,000	106,000	37,000	38,500	44,000
Operational cost/student	354	344	206	247	373	176
Operational cost/student/subject[e]	177	172	103	124	187	176

[a]Instructional center = the basic provisional unit for acquisition cost.

[b]Forty students per single center; 65 students per double center.

[c]In addition to the center, there is one reenforcement area.

[d]The instructional center is augmented by an activity area of equivalent size.

[e]Reading and mathematics for all programs except Program E.

For example, the acquisition cost per student could be obtained, it seems, simply by dividing the acquisition cost by the number of students. The problem lies in just what "number" of students to use. If the total number of students in all the instructional periods (or some such time division) is used, the acquisition cost per student reflects an implicit utilization rate for the instructional center. A case in point is Program C. In that program, the instructional centers are used seven periods (or hours) each day. In current practice, that is the maximum utilization rate for facilities in any one day. In Program A, on the other hand, if the instructional centers had been used for seven periods instead of six, one less instructional center would have had to be furnished.

If the number of students per instructional center is assumed as "best," then the acquisition cost on a per-student basis for each instructional center for each program can be obtained and qualified by a statement of the utilization rate of the instructional centers. An obstacle is encountered in using the acquisition cost per student per program. That is, that the equipment and materials purchased for one year will have more than one year's service as the program is continued. In short, the use of the acquisition cost per student as an indicator of program cost is fraught with hazards. These hazards are explored in the section on estimating the incremental cost of a specific program in a particular district.

Estimating the Incremental Cost

The comparable replication cost serves as an "index" cost for use in the comparative analysis of different programs. It does not answer the question of what a new program might cost if implemented in a specific school district. The incremental cost to the district is necessary in making decisions about whether or not the district can afford a program similar to the successful program in another district. This cost is necessary when deciding the scope and the design of the program that can be accommodated within the resource constraints of the district.

The process of estimating the incremental cost is essentially the same as the process of estimating the comparable replication cost. The

emphasis is on estimating the resource requirements and on translating these requirements into an estimate of cost. In some districts, the unavailability of certain resources might be an obstacle to the implementation of a program even though the district had the funds to afford the program in an accounting sense. This possibility makes it all the more important to estimate the physical resources needed to implement and operate a program.

In estimating the incremental resource requirements, the resources available within the district at no additional cost are taken into account. These resources could be, for example, assets inherited from discontinued programs, physical resources provided cost-free by the community, or volunteer services. After the net incremental resource requirements are determined, district-specific resource prices and cost factors are used to develop the estimated incremental program cost, using the methodology of the planning cost model. Specifically, the standard resource costs and factors shown in Fig. 10 are changed to district-specific costs.

To illustrate the process and considerations in estimating the incremental cost of a program, the data for Program E (shown in estimating the comparable replication cost) will be used. These data are shown in Tables 6, 7, and 8.

Data about Program E could have been generated by either the district of original implementation or by a state or federal agency in their evaluation of programs funded through the agency. Whatever the source, program data of this nature is essential information to another district in its assessment of potentially effective "new" programs.

In this illustration, it is assumed that information about all the programs, A through F, was available and that Program E was tentatively selected as the most-likely-to-succeed program. Preliminary examination of the data used to develop the comparable replication cost (CRC) for Program E leads the district planners to believe that the incremental cost to its district will be significantly lower. The district's current salary schedule sets average teacher salary at $9000 and paraprofessionals at $4000. A major portion of the equipment and materials required for the program are available within the district.

Table 6

PROGRAM AND RESOURCE INFORMATION FOR PROGRAM E

An Elementary Level, Reading and Mathematics Program

Descriptors	*Resource Information*
Students Served	Grades 2-4 Title I; low SES Underachievers
Instruction	
Class time	1.25 hours - Reading 1.25 hours - Mathematics
Number of students	103
Students/instructional area	50±
Number of sections	2
Utilization	5 hours/day
Facilities	
Space	2000 square feet 1 instructional area 1 activity area
Furnishings[a]	6 carrels Carpeting Tables and chairs
Staffing	
Certified teachers	1 per instructional area
Special teachers	None
Paraprofessionals	2 per instructional area 1 per activity area
Equipment[a]	Telex (remote diagnostic) Tape recorders Cassette players Headsets
Materials[a]	Books, games, incentives
Pre-service Training	5 days - formal
In-service Training	3 days - formal
Other support	Remote diagnostic-Prescriptive services

[a]Quantity and quality of items would be specified in supporting lists.

Table 7

COST INFORMATION FOR PROGRAM E

(Costs in dollars)

Item	*Cost*
Facilities Cost	
Total program cost	7,500[a]
Cost per instructional area[a]	5,000
Equipment Cost	
Total	2,000
Cost per instructional area[a]	2,000
Number of instructional areas	1[a]
Students per instructional area	50
Replacement factor 10%	200
Maintenance factor 10%	200
Materials Cost	
Total	8,600
Cost per instructional area	8,600
Number of instructional areas	1[a]
Consumables ($ per student)	10
Pre-service Training	
Number of staff days[b]	20
Cost per day[c]	200
Total cost	4,000
In-service Training	
Number of staff days	12
Cost per day	200
Total cost	2,400
Other support	
Student diagnostic services	50[d]
Program evaluation ($ per student)	10
Consultants ($100 per day)	800

---

[a]One instructional plus one activity area.

[b]Includes time for paraprofessional staff.

[c]Includes salary, materials, and training costs.

[d]Contracted diagnostic and prescriptive services.

Table 8

COMPARABLE REPLICATION COST FOR PROGRAM E

(In dollars)

Item	*Cost*
Acquisition Cost	
Facilities (remodel/furnish)	
Total program cost	7,500
(Cost per instructional area)	(3,750)
Equipment	
Total program cost	2,000
(Cost per instructional area)	(2,000)
Materials	
Total program cost	8,600
(Cost per instructional area)	(8,600)
Pre-service training	4,000
Total acquisition cost	22,100
Operational Cost	
Salaries (including fringe benefits)	
Teachers ($12,000/year)	12,000
Paraprofessionals ($5,000/year)	15,000
Other (variable)	--
Materials	
Program-related (10%)	860
Consumables (student-related)	1,030
Equipment	
Replacement (10%)	200
Maintenance (10%)	200
In-service training	2,400
Other support	
Student diagnostic services[a]	5,000
Program evaluation	1,000
Consultants	800
Total operational cost	38,490

[a]Diagnostic and prescriptive services by contracted services.

For this district, the CRC for Program E represents a maximum expected program cost. For another district, with a higher salary schedule and no equipment or materials on hand, the CRC for Program E would be lower than its incremental cost. Both districts gain needed insights about the cost impact of Program E from just a quick look at the CRC for Program E. These insights cannot be developed if the only cost information the district has about Program E is a cost per student or the total program cost specific to the district originally developing the program.

In developing the program cost estimates for use in designing the scope and nature of Program E, the district determines the resources available within its inventory and matches this information with the resources required to implement and operate the program. The resulting incremental resouree requirements are translated by means of the planning cost model into an estimate of incremental cost. In this translation process, district-specific resource prices and factors are used.

The data needed and the results of the incremental cost analysis for the various configurations of Program E are presented in the same formats as Tables 6, 7, and 8. As an illustration, the incremental cost for two program configurations (160 students and 200 students) is shown in Table 9. The assumptions, incremental resource requirements and district-specific resource prices supporting the cost estimates would be displayed, *in practice*, in the formats of Tables 6 and 7. In this illustration, most of the information can be identified in Table 9. Just briefly, the district has in inventory about 50 percent of the required equipment for a program of 100 students. Adequately remodeled space is available for one instructional area and one activity area. But, two instructional areas and activity areas are needed for 160 students. Only carrels have to be purchased in order to furnish as many as four centers. For one configuration, the district looks at the cost impact of developing an in-house capability for the diagnostic-prescriptive services that are provided to the other configurations on a contracted basis. This leads to an increase in the cost of pre-service training and the additional operational cost for staff members to provide this program-related service.

Table 9

INCREMENTAL COST ESTIMATES FOR ALTERNATIVE CONFIGURATIONS OF PROGRAM E

(In dollars)

Program Cost Category	E_1 *160 students*	E_2 *200 students*	E_3 *160 students*
Acquisition Cost			
Facilities (Remodel/furnish) (1 instructional and 1 activity area have to be remodeled)	3,500	3,500	3,500
Equipment (Unit cost/instructional area for 40 students is $2,000)	3,000	3,800	3,000
Materials (Unit cost for instructional area for 40 students if $6,500)	13,000	17,200	13,000
Pre-service Training (5 days per staff member and training of forty days for diagnostic services in E_3	4,000	8,000	12,000
Total Acquisition Cost	23,500	32,500	31,500
Operational Cost			
Salaries			
Teachers ($9,000)	(2) 18,000	(2) 18,000	(2) 18,000
Paraprofessionals ($4,000)	(2) 8,000	(6) 24,000	(2) 8,000
Other ($5,000/1/3 time)	---	---	---
Materials			
Program-related	1,300	1,720	1,300
Consumables	1,600	2,000	1,600
Equipment			
Replacement	400	500	400
Maintenance	400	500	400
In-service Training	3,200	6,400	3,200
Other support			
Student diagnostic services	8,000	10,000	---
Program evaluation	1,600	2,000	3,200
Consultants	800	800	800
Total Operational Cost	43,300	65,920	41,900

The resulting program cost analysis provides the information needed by the district in making the decision about whether to plan the implementation of the program and, if so, what configuration of program can be afforded within the resource constraints of the district. As a final note, two points should be made clear. First, these cost estimates are *planning* cost estimates. Much greater detail and accuracy are required to meet the needs of actual implementation and financial accountability. Second, analysis of the dollar-cost alone does not provide adequate information for educational decisions; for this reason the emphasis here is on the analysis of both the dollar and non-dollar resources required for alternative programs.

Appendix

DETAILS OF PROGRAM AND RESOURCE INFORMATION

Table 10

PROGRAM AND RESOURCE INFORMATION

Program A

Descriptors	*Information*
Characteristics of Students Served	Grades 7-12 Educationally disadvantaged (at least 2 years below level)
Number of Students	350 {Reading Math
Instructional	
Class time	{1 period Math 1 period Reading
Class size	20 students per classroom area
Facilities	
Space	4 trailers @ 900 sq ft
Students/classroom/day	2 classrooms @ 1000 sq ft
Utilization	6 hr/day; three 2-hr shifts
Furnishings	Desks, carrels, carpet, air conditioning
Staffing	
Teachers	6
Special teachers	0
Paraprofessionals	6
Other personnel	Project manager; associate manager
Equipment	Dorsett M-86 Teaching Machines
Materials	Filmstrips, records
Pre-service Training	1 week per teacher
In-service Training	5 days total
Other Support	
Incentives	

Table 11

PROGRAM AND RESOURCE INFORMATION

Program B

Descriptor	*Information*
Characteristics of Students Served	7-12 grades Educationally handicapped (at least 2 years below grade level)
Number of Students	285 { Reading Math
Instruction	{ 1 period Math 1 period Reading 20 students per classroom area
Facilities	
Space	4 trailers @ 900 sq ft 1 classroom @ 1000 sq ft
Number of students	20 per classroom area
Utilization	6 hr/day; three 2-hr shifts
Furnishings	Desks, carrels, carpeting, air conditioning
Staffing	
Teachers	5
Specialists	0
Paraprofessionals	5
Other staff	Project manager; associate manager
Equipment	EDL, AUD-X, Tach-X, controlled readers, Flash-X
Materials	Filmstrips, discs
Pre-service Training	40 hr per teacher and aide
In-service Training	No formal training
Other Support	None

Table 12

PROGRAM AND RESOURCE INFORMATION

Program C

Descriptors	*Information*	
Characteristics of Students	Grades 6-9 Transient $\frac{1280}{1100}$ yearly turnover Black, model cities neighborhood Low income Lowest achievers according to last spring's testing Specialized pupils included Program pupils distributed among all homerooms	
Instructional		
Number of students (as of mid-December)	491 (Reading); 535 (Math) (same students)	
Class time	45 minutes/day (Reading and Math each)	
Class size	35-40 in single center (SC) (40 optimum); 60-65 in double center (DC) (optimum)	
Number of sections	14 each (7-period day)	
Facilities Space	4 centers: 1 DC for reading and math; 1 SC for reading and 1 SC for math; each center has an instructional and an AMS area 1 reinforcement room total occupies space of 7 former classrooms (walls were changed)	
Students/classroom/day	$\frac{\text{No. students per day}}{\text{No. classrooms}} = \frac{(491 + 535)}{7} = 147$	
Furnishings	Table space for carrels Carpeting Air conditioning 1 carrel per student per class (i.e., approximately 140 total) Chairs	
Staffing		
Certified teachers	1 per center (Reading and Math each)	
Special teachers	None	
Paraprofessionals	Full-time: 1/center; 1 for reinforcement room 1 Substitute	
Other personnel	1 full-time director 1 full-time secretary	
Equipment	*Reading*	*Math*
Primary unit	40 Hoffman Reading machines	40 tape recorders/center (80 total)
Supplementary system	25 tape recorders/center (50 total)	40 flashcard readers (Electronic Futures, mfg.)
Redundant system	← 15 Borg-Warner System 80 →	
Materials (10% consumable)	2 sets EPL tapes/center 2 sets Hoffman materials (levels B to G)/center Workbooks (not on per pupil basis)	Math mini system (tapes) Workbooks (not on per pupil basis)
	2 sets Borg-Warner materials (levels 1-8) per reading and math center (i.e., of complete sets) 1 notebook per student for compiling materials	
Pre-service training	One week on AMS in-depth training One week going through materials	
In-service training	About 2 hr/week	
Other Support	None, instructional program self-contained	

Table 13

PROGRAM AND RESOURCE INFORMATION

Program D

Descriptors	*Information*
Characteristics of Students	Grades 1-6 Inner-city, black, low income Transiency = 30% Lowest achievers for first 5 months, then entire school (excluding most special education students)
Program Scope	
Instruction	Reading and math
Number of students	Initially 100, later 150 (as of February)
Class time	Initially 2-1/4 hr, later reduced to 75 minutes for grades 1-4
Class size	45-55 (maximum at 60)
Number of sections	Three (one each for grades 1 and 4, 2 and 3, and 5 and 6)
Facilities	
Space	Two regular classrooms
Students/classroom/day	75
Furnishings	30 carrels and chairs, with electric outlets at each carrel 7 tables, 21 chairs 3 bookshelf-cabinets Carpeting
Staffing	
Certified teachers	One (no outside preparation required)
Special teachers	None
Paraprofessionals	Two, 6-hr day
Other personnel	On-site director and secretary
Equipment	
Telex	1
Cassette tape records	30
Materials	BRL modern math texts Large variety of other materials
Pre-service Training	Five days for entire staff of school
In-service Training	Eight morning meetings for entire staff
Other Support	None

Table 14

PROGRAM AND RESOURCE INFORMATION

Program E

Descriptors	*Information*
Characteristics of Students Served	Grades 2-4; Title I Low SES
Instruction	
Class time	1.25 Reading 1.25 Math
Number of students	103
Class size	50 students per class
Number of sections	2
Utilization	5 hr. per day
Facilities	
Space	2000 sq ft 1 classroom 1 activity area
Furnishings	6 carrels Carpeting Tables
Staffing	
Certified teachers	1 per center
Special teachers	none
Paraprofessionals	2 per center 1 per activity area
Other personnel	
Equipment	Telex Tape recorders Cassette players Headset
Materials	Books, games, toys
Pre-service Training	5 days
In-service Training	4 days, total
Other Support	Remote diagnostic and prescriptive
Incentives	25 per student--candy, scrip

Table 15

PROGRAM AND RESOURCE INFORMATION

Program F

Descriptors	*Information*
Characteristics of Students Served	Title I students
Number of Students	250
Instructional	
Class time	50 minutes
Class size	25
Number of sections, school	5
Facilities	
Space	Regular classrooms
Students/classroom/day	125
Utilization	100%
Furnishings	Air conditioning, pleasant environment; small, modern (partitions, file cabinets, storage cabinets, etc., loose table, chairs)
Staffing	
Teachers	1 classroom
Special teachers	0
Paraprofessionals	1
Other personnel	1 program director
Equipment	6 Cassette players ($25) 6 tape recorder ($150) Earphones ($50)
Materials	Sound filmstrip sets Cassettes Workbooks and miscellaneous supplies
Pre-service Training	1 week
In-service Training	3 days
Other Support	Evaluation: $10 per child
Incentives	300 books given as awards